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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Discernible rhythm in the spatio/temporal distributions of transatlantic dust" *by* Y. Ben-Ami et al.

Anonymous Referee #2

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General:

The authors try to emphasis the role of the Bodele Depression for the transatlantic dust transport during the winter season. This is another paper of the authors on this topic. The study contains some new ideas regarding the link between dust sources in Africa and dust long range transport from Africa to America. The paper may stimulate further work to investigate the Saharan dust source distribution and the role and contribution of different dust source areas to the long term dust advection.

The paper is appropriate for ACP. However, revisions are necessary.

Details:

The Abstract is too long. Goal, methods, and essential findings should be given only,

no separating paragraphs, just about 20 lines.

The introduction is lengthy and circumvents the recent and relevant literature from AMMA (DABEX, DODO) in JGR 2008 and SAMUM in Tellus 2009 and 2011. These campaigns show all the aerosol layering pattern during winter and summer mode (over central, western Africa including Cape Verde). Taking the CALIPSO observations of Saharan dust pattern over Africa and the Atlantic into account (JGR, 2008) there is almost a complete vertically resolved characterisation of dust features in winter and summer including the documentation of complex mixing and layering of dust and smoke at heights above 1000 m in winter.

Page 23517: Especially here the DABEX and SAMUM literature should be cited. There are so many papers in the respective special issues describing the layering and mixing of dust and smoke.

Page 23519: I am not sure that such a complex mixture of dust and smoke as documented in the DABEX and SAMUM 2 papers allow such a simple separation of dust and smoke as done here. How large can the smoke-related AODs be? Please, provide some numbers! To my opinion the retrieved dust-related AODs in winter can easily be wrong by 0.1-0.3 because of an erroneous smoke AOD subtraction.

Page 23520: Hovmoller diagrams. . .. Provide reference!

Page 23521: Again, hot spots (spikes, mostly in winter) in the AOD time series can easily be produced by strong smoke events. There is no reason to speculate that all these spikes are caused by dust outbreak events. I do not trust Figure 3a, and consequently I do not agree with the (speculative) discussion on the following pages. This problem must at least be mentioned in the revised version.

The variability in Figs 4 and 5 is especially high in winter (smoke impact).

Page 23522: The authors finally state that the found 3-5 days lag suggests that the Bodele is a key source. May be! However, all emitted Saharan dust needs about 3-5

days to show up over the Atlantic Ocean (after crossing the burning areas in central, western Africa), and the highest AODs are found around the central western African coast (Figure 1, south of 10 degrees N). And all the winter AODs are highly influenced by smoke, as already mentioned several times.

If the correlation study would exclude the zones near Africa, and thus consider areas over the Atlantic only, e.g., 20 W, the correlation results with focus on the role of Bodele would be more convincing.

As a conclusion, the impression is left: Many parts of the paper are speculative. Strong uncertainties in the AODs caused by a high uncertainty in the subtraction of smoke contributions are ignored.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 23513, 2011.